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PATENT SPECIFICATION

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PROVISIONAL SPECIFICATION

Thermostat for Controlling Automatically the Jacket Cooling Water of Internal Combustion Engines and other Machines

I, Harry Parsons, Brampton, Bassett Avenue, Southampton, British, do hereby declare the nature of this invention to be as follows:—

In order to control the temperature of the water in the jackets for cooling cylinders and other parts, it has been usual to by-pass some of the delivery water from the circulating pump back to the pump suction by means of a 3-way cock or otherwise regulated by hand. To accomplish this automatically, I insert in the water delivery pipe from the cylinder jacket a thermostat comprising the usual form of bellows or expanding element arranged in the stream of water and expanding and contracting according to the temperature.

The invention is particularly adapted to circulation systems in which the water, after cooling the cylinders, is passed overboard or to waste, its place being taken by water from some convenient source into the pump.

Attached to the said bellows is a spindle carrying two valve heads a little distance apart, one of which opens a passage from the thermostat body to the aforesaid by-pass and the other valve on further expansion of the spindle closes this by-pass. In operation, therefore, air cannot be drawn into the pump when starting all cold as might otherwise happen, and on the temperature rising further to some agreed point, the second valve cuts off the by-pass altogether.

In practice, a position is reached where the two valves are both open in such relation as to maintain approximately a pre-arranged temperature of the water. If the heat rises further then the by-pass is closed and all the water passes to waste, cold water only reaching the pump.

In order to avoid air reaching the pump by way of the exhaust pipe when running for long periods throttled down, a non-return valve can be placed in the delivery pipe from the thermostat. This valve operates quite independently of the aforesaid thermostat valves.

Dated the fifteenth day of October, 1936.

HARRY PARSONS.

COMPLETE SPECIFICATION

Thermostat for Controlling Automatically the Jacket Cooling Water of Internal Combustion Engines and other Machines

I, Harry Parsons, a British subject, of Brampton, Bassett Avenue, Southampton, do hereby declare the nature of this invention and in what manner the same is to be performed to be particularly described and ascertained in and by the following statement:—

It is already known in closed circuit cooling systems with pump circulation for instance for internal combustion engines, to incorporate a thermostat device between the cylinder jacket outlet and the radiator inlet which when the water temperature is low closes a valve to the radiator and opens a valve to a by-pass leading to the pump inlet; as the water warms the expanding element of the thermostat device opens the former valve and closes the latter.

In the case of open circuit cooling sytems, that is to say cooling systems in which the pump draws from a convenient large body of cold water and the water after passage through the jacket is discharged to waste (the water may be drawn from and discharged to the same body of water for instance the water on which a motor boat floats but the system is still an open one) there is even greater risk of excessive cooling and it has been usual in such cases to provide a by-pass from the jacket delivery pipe so that hot water can be directed straight back to the pump suction but so far as I am aware no thermostat control has been provided, the by-pass being regulated by hand as a 3-way cock.

In such systems when the engine is at

Price [illegible]

a standstill the discharge pipe is empty of water and when the engine is started up, if the by-pass is open there is a great risk of drawing air (or air and exhaust gas where the latter is mixed with discharging cooling water to assist silencing) into the pump and thus preventing proper operation of the pump. According to the invention therefore I provide a thermostat device arranged to close a by-pass back to the pump suction when its temperature is raised by the liquid coming from the jacket and to open the by-pass as its temperature falls from that at which it closes the by-pass, means such as a valve also being provided adapted to check the entry of air from the discharge pipe, at least when starting up the engine or machine. The present invention further resides in an arrangement of thermostat device suitable for use in a system as just set forth. This device comprises a liquid space, three connections to said space respectively constituting an inlet for liquid from the jackets, an outlet to the discharge pipe and a by-pass, and an element expanding when heated included in said space, the element being arranged to control only the by-pass connection by closing it when it expands and opening it as it contracts from the closing position, means such as a valve also being provided adapted to check the flow of air (or gas) from the uncontrolled outlet connection to the controlled by-pass connection at least when the thermostat is in quite cold condition (i.e. when the engine or machine is started up from cold). Since the entry of air is only likely to occur during starting, the means for checking the flow of air from the outlet to the by-pass may be a valve operated by the expanding element to close the by-pass when the element is in its condition of maximum contraction. Instead the means in question may be a simple non-return valve between the outlet connection and the by-pass connection, and it will then at all times prevent the entry of air into the by-pass a risk of which may arise during long periods of low throttle opening when the by-pass will be wide open; it will act equally against the entry of exhaust gases where these are mixed with the discharged water to cool them. It is also possible to provide both valves above mentioned.

By way of example two embodiments of the invention are illustrated in section in Figures 1 and 2 respectively of the accompanying drawings.

In both figures the water from the jackets enters at 1 and that part which is discharged leaves at 2. The by-pass connection is at 3 and leads to the suction side of the pump, the pump preferably being located at such level that it is submerged. Within the body of the device and in the path of the water is an element which expands on being heated, here shown as a sealed metallic bellows 4. A thermometer connection can be provided at 5.

In Figure 1, the upper end of the bellows 4 is fixed and the lower end guided by a stem 6 passing through a hole in a bridge piece 7. The lower end of the stem carries a valve disc 8 coacting with the upper end of the by-pass 3. The stem 6 carries another valve disc 9 which closes upwardly and when the bellows is in its position of maximum contraction closes the by-pass. It will be in this position at starting up from cold and then prevents air or gases entering the by-pass from the discharge 2. As soon as the water is a little warm however the valve 9 opens and water flows through the by-pass thus assisting in warming up the engine. As the water gets hotter the bellows expands and the valve 8 commences to throttle the by-pass thus cutting down the supply of hot water to the pump and an equilibrium is reached.

At starting, for instance if the main suction pipe to the pump were closed, the suction of the pump through the by-pass might pull the valve 9 off its seat and allow air to be drawn in from 2. To prevent any possibility of this, a hand controlled cock 10 may be provided in the by-pass which can be opened as soon as it is clear that water is entering at the main suction pipe. Such cock also enables the device to be regulated and enables one size of device to be adapted to a relatively large range of engine sizes. Such regulation could also be provided by means of interchangeable nipples in the by-pass.

In Figure 2 the upper end of the bellows 4 is fixed and the lower end guided by an apertured plate 11 sliding in the by-pass. The bottom plate 12 of the bellows here acts itself as a valve cooperating with the top edge of the by-pass. A non return valve in the form of a poppet valve 13 is provided to which the discharge water obtains access through a port 14. This enables water to be discharged but prevents the entry of air or gas from discharge pipe and allows the valve 9 of Figure 1 to be dispensed with. A cock 10 may however be provided in the by-pass as in Figure 1 and interchangeable nipples may also be used for the same purpose.

In a like manner a non return valve such as 13 may be used in Figure 1.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed I declare that what I claim is:—

1. In an open circuit cooling system for internal combustion engines and other machines utilising cooling liquid pumped through jackets and then discharged, the provision of a thermostat device arranged to close a by-pass back to the pump suction when its temperature is raised by the liquid coming from the jackets and to open the by-pass as its temperature falls from that at which it closes the by-pass, means such as a valve also being provided adapted to check the entry of air from the discharge pipe, at least when starting up the engine or machine.

2. A thermostat device suitable for use in a system according to claim 1 comprising a liquid space, three connections to said space respectively constituting an inlet for the liquid from the jackets, an outlet to the discharge pipe and a by-pass, and an element expanding when heated included in said space, the element being arranged to control only the by-pass connection by closing it when it expands and opening it as it contracts from the closing position, means such as a valve also being provided adapted to check the flow of air (or gas) from the uncontrolled outlet connection to the controlled by-pass connection at least when the expanding element is in quite cold condition (i.e. when the engine or machine is started up from cold).

3. A device according to claim 2 in which the means for checking the flow of air from the outlet to the by-pass is a valve which closes the by-pass connection under the action of the expanding element when the latter is at maximum contraction.

4. A device according to claim 2 or 3 having a non return valve between the outlet connection and the by-pass connection.

5. A device according to claim 2, 3 or 4 in which the by-pass connection is also provided with manual closing and adjusting means.

6. A thermostat device substantially as described and shown in Figure 1 or 2 of the accompanying drawings.

Dated this 18th day of October, 1937.

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[This Drawing is a reproduction of the Original on a reduced scale.]